Faculty of Science and Humanities
B.Sc. (Mathematics) (Semester - 5)
In Effect from Academic Year 2023-24

Branch Name:	B.Sc. Mathematics
Program Code:	SC104
Course Name:	MATLAB Practical
Course Code:	2SC1040505
Pre-requisite Course:	

Course Objectives:

1. To understand the basic concept of Starting and ending MATLAB session.
2. To understand the concept of entering data in matrices using MATLAB.
3. To know about Two-dimensional plots using MATLAB.
4. To understand the Numerical Methods Practical (Lab) using MATLAB.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
				Theory (Marks)		Practical (Marks)		
Lecture (L)	Tutorial (T)	Practical (P)	Credit	University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	Total (Marks)
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Subject Contents:

Sr. No	Topic	Total Hours	Weightage (%)
1	**Introduction to MATLAB/ PYTHON/ SCILAB :** Starting and ending MATLAB session, MATLAB environment, MATLAB help, types of files, search path, some useful MATLAB commands, data types, constant and variables, operators, built in functions, assignment statement, and illustrative programs. **Vectors and Matrices :** Scalars and vectors, entering data in matrices, line continuation, matrix subscripts/indices, multidimensional matrices and arrays, matrix manipulations, generation of special matrices, useful commands, matrix and array operations, function with array inputs.	44	25
2	**Polynomials :** Entering a polynomial, polynomial evaluation, roots of a polynomial, polynomial operations - addition and subtraction, multiplication, division, formulation of polynomial equation, characteristic polynomial of a matrix, polynomial differentiation, integration, and curve fitting, evaluation of Polynomial with matrix arguments.	48	25
3	**MATLAB/ PYTHON/ SCILAB Graphics :** Two-dimensional plots, multiple plots, style options, legend command, subplots, specialized two dimensional plots, three-dimensional plots.	50	25
4	**Practical using MATLAB/ PYTHON/ SCILAB programming** List of practical is given in Appendix A.	50	25

Reference Books:

1. "MATLAB and its Applications in Engineering" Raj Kumar Bansal, Ashok Kumar Goel, Manoj Kumar Sharma, Pearson.
2. Python Essential Reference (Developer's Library),4th Edition by David M. Beazley, Addison – Wesley Professional.
3. An introduction to Scilab - CSE, IIT Bombay.

Coverage from the Reference Book for MATLAB:

UNIT-1

Chapter 1: 1.8, Chapter 2: 2.9 Chapter 3: 3.11

UNIT-2

Chapter 4: 4.13

UNIT-3

Chapter 6: 6.8

UNIT-4

Appendix B

Symbolic Math Toolbox

Functions for Creating and Evaluating Symbolic Expressions	
Class	Returns the class of an expression.
Digits	Sets the number of decimal digits used to do variable precision arithmetic.
Double	Converts an expression to numeric form.
Ezplot	Generates a plot of a symbolic expression.
ezplot3	3-D parametric plot
Ezpolar	plot a 2-D curve in polar coordinates
Findsym	Finds the symbolic variables in a symbolic expression.
Numden	Returns the numerator and denominator of an expression.
Sym	Creates a symbolic variable.
Syms	Creates one or more symbolic variables.
Vpa	Sets the number of digits used to evaluate expressions.

Functions for Manipulating Symbolic Expressions	
Collect	Collects coefficients of like powers in an expression.
Expand	Expands an expression by carrying out jpowers.
Factor	Factors an expression.
poly2sym	Converts a polynomial coefficient vector to a symbolic polynomial.
Pretty	Displays an expression in a form that resembles typeset mathematics.
Simple	Searches for the shortest form of an expression.
Simplify	Simplifies an expression using Maple's simplification rules.
Subs	Substitutes variables or expressions.
sym2poly	Converts an expression to a polynomial coefficient vector.

Symbolic Calculus Functions	
Diff	Returns the derivative of an expression.
Jacobian	Compute the Jacobian matrix.
Dirac	Dirac delta function (unit impulse).
Heaviside	Heaviside function (unit step).
Int	Returns the integral of an expression.
Limit	Returns the limit of an expression
Symsum	Returns the symbolic summation of an expression.
Taylor	Returns the Taylor series of a function.

Symbolic Tutors	
Arclen	Find the arc length of the curve.
Composefun	compose two functions.
Dirdifftool	plot or animate directional derivatives.
Eigtool	interactive matrix eigenvalues.
Gradtool	plot or animate gradient(s).
Linsys	plot a system of 2-D or 3-D linear equations
Ratfun	demonstrate the graphing of rational functions.
Rsums	Riemann sum approximate integration tutor
Taylortool	taylor approximation tutor

Appendix A:

1. Numerical Methods Practical (Lab) using MATLAB/ PYTHON/ SCILAB programming
2. Calculus
3. Optimization
4. Problems related to programming given in text book.

Assignment: The student should submit the electronic copy of diary file showing the execution/output of Matlab/ Python/ Scilab session(s).

List of Open Source Software/learning website:

1. https://www.youtube.com/watch?v=eilJQja9qLU
2. https://www.youtube.com/watch?v=R6mYJtOJlAU
3. https://www.youtube.com/watch?v=BO5tqj_0bKQ
4. https://www.youtube.com/watch?v=fCKUOWiM-6s&list=PLgzdggUFmFVwfo7pDvethv_bT86zhMar0

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom'sTaxonomyLevel
CLO1	**Describe** some useful MATLAB commands.	1 Remembering
CLO2	**Discuss** the knowledge on constant and variables.	2 Understanding
CLO3	**Use** roots of a polynomial and **solve** the example of it's by using MATLAB.	3 Applying
CLO4	**Explain** evaluation of Polynomial with matrix arguments.	4 Analysing,
CLO5	Know the formulation of polynomial equation to **Justify** the application of it's by using MATLAB.	5 Evaluating
CLO6	**Create** 2-D graph by using MATLAB.	6 creating

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO1	L	L			M						M	L	M	M	M	
CLO2	L			L	L								L		L	
CLO3	L	L			M				L				L		M	
CLO4		M		L										L	L	
CLO5	L	L			M				L				L		M	
CLO6	L	L	M		M				L		M		L		L	

H: High, M: Medium, L: Low